

REMARKS

The forgoing amendment amends claims 3, 5, 9, 11-13 and 15, and cancels claim 1. Claim 2 was canceled previously. Now pending in the application are claims 3-19, of which claims 3, 9, 13 and 15 are independent.

I. Telephone interview and Claim Amendments

Applicants thank the Examiner for the courtesy of a telephone interview conducted on January 22, 2008.

During the interview, Applicants argued to the Examiner that the cited Hirakata, Mizuno and Jia references do not teach the signal pressure pipe (claim 3), the flow-in pipe (claim 9), the flow-in pipe and the flow-out pipe (claim 13) and the ventilation pipe (claim 15). Applicants specifically argued to the Examiner that the hydrogen gas separated from the cooling liquid is provided to the cathode of a fuel cell through these pipes.

In response, the Examiner contends that the Jia reference teaches a pipe that supplies a hydrogen gas to the cathode of a fuel cell. Applicants argued to the Examiner that the Jia reference teaches supplying *only a hydrogen gas* to the cathode of a fuel cell for quick conditioning purposes while the pipe of the present application supplies a mixed gas to the cathode of the fuel cell.

Applicants also discussed the advantages of the present application. Applicants referred to the present application at pages 20-21, which describes an exemplary embodiment of the present application in which the mixed gas is supplied to the cathode of a fuel cell so that the hydrogen gas separated from the cooling liquid is combusted in the fuel cell. Applicants argued to the Examiner that this feature provides more safety than exhausting the mixed gas directly to the atmosphere because the hydrogen gas is combusted before exhausted into the atmosphere.

In response, the Examiner mentioned that he needs to discuss Applicants' arguments with his supervisor.

The Examiner contacted Applicants after the interview and provided his comments that since the present application teaches the first embodiment (claimed feature) that supplies the mixed gas to the cathode of a fuel cell and the second embodiment that exhausts the mixed gas to the atmosphere, he deems that the second embodiment may provide the same advantage as the first embodiment. The Examiner requested evidence that shows the advantage of the first embodiment over the second embodiment.

Based on the discussion with the Examiner, Applicants amend claims 3, 9, 13 and 15 to further distinguish the present application over the cited prior art references. Applicants cancel claim 2. Support for the claim amendments can be found throughout the original figures and corresponding descriptions in the specification. No new matter is added.

Applicants specifically note that Applicants amend or cancel the claims to expedite the prosecution of the present application. The amendment should not be construed as an acquiescence of the rejections in the Office Action. Applicants reserve the right to pursue the canceled claims in the same or separate application.

II. Summary of Rejections

Claims 1-2 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent Application Publication No. 2001/0019789 (“Hirakata”) in view of U.S. Patent Application Publication No. 2002/0189873 (“Mizuno”).

Claim 2 is rejected under 35 U.S.C. §103(a) as being unpatentable over Hirakata in view of Mizuno and further in view of U.S. Patent Application Publication No. 2003/0224226 (“Jia”).

Claims 3-6, 8-12 and 15-19 are rejected under 35 U.S.C. §103(a) as being unpatentable over Hirakata in view of Mizuno.

Claim 7 is rejected under 35 U.S.C. §103(a) as being unpatentable over Hirakata in view of Mizuno, and further in view of U.S. Patent No. 4,923,768 (“Kaneko”).

Claim 13-14 are rejected under 35 U.S.C. §103(a) as being unpatentable over Hirakata in view of Mizuno, and further in view of Jia.

The rejections will be discussed separately below.

III. Rejections of Claims 1-2 under 35 U.S.C. §103

Claims 1-2 are rejected under 35 U.S.C. §103(a) as being unpatentable over Hirakata in view of Mizuno. See the Office Action, page 3. In the foregoing amendment, Applicants canceled claim 1. Claim 2 was canceled previously. As such, Applicants submit that the rejection of claims 1-2 is moot. Therefore, Applicants respectfully request that the Examiner withdraw the above 35 U.S.C. §103(a) rejection of claims 1-2.

IV. Rejection of Claim 2 under 35 U.S.C. §103

Claim 2 is rejected under 35 U.S.C. §103(a) as being unpatentable over Hirakata in view of Mizuno and further in view of Jia. See the Office Action, page 5. Applicants note that claim 2 was canceled previously. Therefore, Applicants respectfully request that the Examiner withdraw the above 35 U.S.C. §103(a) rejection of claim 2.

V. Claim Rejections under 35 U.S.C. §103

Claims 3-6, 8-12 and 15-19 are rejected under 35 U.S.C. §103(a) as being unpatentable over Hirakata in view of Mizuno. See the Office Action, page 6. Applicants respectfully traverse this rejection.

A. Claim 3

Applicants respectfully submit that the combination of Hirakata and Mizuno does not teach or suggest “a signal pressure pipe connected to a downstream side of the air pump and the cooling liquid storage container, wherein a pressure within the signal pressure pipe is changed by changing a rotation speed of the air pump,” as recited in claim 3.

The Hirakata reference teaches the collection of a hydrogen gas from the cooling water. The Mizuno reference teaches a hydrogen dilutor. The hydrogen dilutor of the Mizuno reference mixes the hydrogen gas discharged from a fuel cell with the oxygen off-gas that is also

discharged from the fuel cell, and introduces the mixed gas into the oxygen off-gas discharging channel. Although the Hirakata and Mizuno references are combined, the combination of the Hirakata and Mizuno references does not teach or suggest “a signal pressure pipe connected to a downstream side of the air pump and the cooling liquid storage container, wherein a pressure within the signal pressure pipe is changed by changing a rotation speed of the air pump,” as recited in claim 3. In claim 3, the pressure in the signal pressure pipe is changed by changing the rotation speed of the air pump. The cited Hirakata and Mizuno references do not teach or suggest any pipe that is connected to the cooling liquid storage container and the pressure of which is controlled by the air pump.

Applicants also respectfully submit that Hirakata and Mizuno do not teach or suggest that “said signal pressure pipe communicates with said cooling liquid storage container and said supply air pipe to direct a hydrogen gas in said cooling liquid storage container to said supply air pipe,” as recited in claim 3.

The Hirakata reference teaches that the hydrogen gas leaking into the cooling water is collected in the upper tank (12) or the reserve tank (24) where the gas detectors are mounted. If the hydrogen sensors detect the hydrogen collected in the upper tank (12) or the reserve tank (24), the hydrogen leakage warning lamp (92) informs the driver of the leakage. The Hirakata reference, however, does not teach or suggest that a mixed gas is introduced to the cathode of a fuel cell.

The Mizuno reference teaches a hydrogen dilutor (424) that receives the hydrogen gas discharged from the fuel cell. The Mizuno reference also teaches that the hydrogen dilutor (424) receives the oxygen off-gas discharged from the fuel cell. The hydrogen dilutor (424) dilutes the discharged hydrogen gas by mixing the hydrogen gas and the oxygen off-gas. The diluted hydrogen gas is introduced into the oxygen off-gas discharging channel (503). The Mizuno reference, however, does not teach or suggest that a mixed gas is introduced to the cathode of a fuel cell.

In contrast, the signal pressure pipe recited in claim 3 enables the hydrogen gas collected from the cooling liquid to be supplied to the cathode of a fuel cell. Since the hydrogen gas is

mixed with air and then supplied to the cathode of the fuel cell, the hydrogen gas separated from the cooling liquid is combusted in the fuel cell. This feature of the present application enhances safety because the hydrogen gas is combusted in the fuel cell before exhausted into the atmosphere. See the instant application, pages 20-21. The cited Hirakata and Mizuno references do not teach or suggest any pipe that connects the cooling liquid storage container to the cathode of a fuel cell.

For reasons set forth above, Applicants submit that Hirakata and Mizuno fail to teach or suggest all of the limitations of claim 3. Applicants respectfully request withdrawal of the 35 U.S.C. §103(a) rejection of claim 3.

B. Claims 4-6

Claims 4-6 depend from claim 3 and, as such, incorporate the patentable features of claim 3. Applicants therefore request withdrawal of the 35 U.S.C. §103(a) rejection of claims 4-6.

C. Claim 9

Applicants respectfully submit that Hirakata and Mizuno do not teach or suggest “a flow-in pipe connected to a downstream side of the air pump and the cooling liquid storage container, wherein a pressure in the flow-in pipe is changed by changing a rotation speed of the air pump,” as recited in claim 9.

As discussed above, the Hirakata reference teaches the collection of the hydrogen gas from the cooling water while the Mizuno reference teaches a hydrogen dilutor. The combination of the Hirakata and Mizuno references, however, does not teach or suggest “a flow-in pipe connected to a downstream side of the air pump and the cooling liquid storage container, wherein a pressure in the flow-in pipe is changed by changing a rotation speed of the air pump,” as recited in claim 9. The cited Hirakata and Mizuno references do not teach or suggest any pipe that is connected to the cooling liquid storage container and the pressure of which is controlled by the air pump.

Applicants also respectfully submit that Hirakata and Mizuno do not teach or suggest that “said flow-in pipe communicates with said cooling liquid storage container and said supply air pipe to direct the mixed gas in said gas phase portion of said cooling liquid storage container to said supply air pipe,” as recited in claim 9.

As discussed above, the Hirakata reference teaches the collection of the hydrogen gas from the cooling water. The Mizuno reference teaches a hydrogen dilutor. The combination of the Hirakata and Mizuno references, however, does not teach or suggest that “said flow-in pipe communicates with said cooling liquid storage container and said supply air pipe to direct the mixed gas in said gas phase portion of said cooling liquid storage container to said supply air pipe,” as recited in claim 9. The flow-in pipe recited in claim 9 enables the hydrogen gas collected from the cooling to be supplied to the cathode of a fuel cell and combusted in the fuel cell. The cited Hirakata and Mizuno references do not teach or suggest any pipe that connects the cooling liquid storage container to the cathode of a fuel cell.

For reasons set forth above, Applicants submit that Hirakata and Mizuno fail to teach or suggest all of the limitations of claim 9. Applicants therefore request withdrawal of the rejection of claim 9.

D. Claims 10-12

Claims 10-12 depend from claim 9 and, as such, incorporate the patentable features of claim 9. Applicants therefore request withdrawal of the rejection of claims 10-12.

E. Claim 15

Applicants respectfully submit that Hirakata and Mizuno do not teach or suggest “a ventilation pipe connected to a downstream side of the air pump and the cooling liquid storage container, wherein a pressure in the ventilation pipe is changed by changing a rotation speed of the air pump,” as recited in claim 15.

As discussed above, the Hirakata reference teaches the collection of the hydrogen gas from the cooling water while the Mizuno reference teaches a hydrogen dilutor. The combination of the Hirakata and Mizuno references, however, does not teach or suggest “a ventilation pipe

connected to a downstream side of the air pump and the cooling liquid storage container, wherein a pressure in the ventilation pipe is changed by changing a rotation speed of the air pump,” as recited in claim 15. The cited Hirakata and Mizuno references do not teach or suggest any pipe that is connected the cooling liquid storage container and the pressure of which is controlled by the air pump.

Applicants also respectfully submit that combination of Hirakata and Mizuno do not teach or suggest that “said ventilation pipe communicates with said cooling liquid storage container and said air pipe to direct the air in said air pipe to said cooling liquid storage container,” as recited in claim 15.

As discussed above, the Hirakata reference teaches the collection of the hydrogen gas from the cooling water. The hydrogen dilutor of the Mizuno reference mixes the hydrogen gas discharged from a fuel cell with the oxygen off-gas that is also discharged from the fuel cell, and introduces the mixed gas into the oxygen off-gas discharging channel. The combination of the Hirakata and Mizuno references, however, does not teach or suggest that “said ventilation pipe communicates with said cooling liquid storage container and said air pipe to direct the air in said air pipe to said cooling liquid storage container,” as recited in claim 15. The ventilation pipe recited in claim enables air in the air pipe to be supplied to the cooling liquid storage container. The cited Hirakata and Mizuno references do not teach or suggest any pipe that connects the cooling liquid storage container to the air pipe.

For reasons set forth above, Applicants submit that Hirakata and Mizuno fail to teach or suggest all of the limitations of claim 15. Applicants therefore request withdrawal of the rejection of claim 15.

F. Claims 16-19

Claims 16-19 depend from claim 15 and, as such, incorporate the patentable features of claim 15. Applicants therefore request withdrawal of the rejection of claims 16-19.

VI. Rejection of Claim 7 under 35 U.S.C. §103

Claim 7 is rejected under 35 U.S.C. §103(a) as being unpatentable over Hirakata in view of Mizuno, and further in view of Kaneko. See the Office Action, page 11. Applicants respectfully traverse this rejection.

Claim 7 depends from claim 3 and, as such, incorporates the subject matter of claim 3.

Applicants respectfully submit that the combination of Hirakata, Mizuno and Kaneko does not teach or suggest “a signal pressure pipe connected to a downstream side of the air pump and the cooling liquid storage container, wherein a pressure within the signal pressure pipe is changed by changing a rotation speed of the air pump,” as recited in claim 3. As discussed above, Hirakata and Mizuno do not teach or suggest this feature. Kaneko teaches a compressor to raise the reaction air pressure to be supplied to a fuel cell. Kaneko, however, does not teach or suggest “a signal pressure pipe connected to a downstream side of the air pump and the cooling liquid storage container, wherein a pressure within the signal pressure pipe is changed by changing a rotation speed of the air pump,” as recited in claim 3. Kaneko does not teach or suggest any pipe that is connected to the cooling liquid storage container and the pressure of which is controlled by the air pump.

Applicants also respectfully submit that the combination of Hirakata, Mizuno and Kaneko does not teach or suggest that “said signal pressure pipe communicates with said cooling liquid storage container and said supply air pipe to direct the hydrogen gas in said cooling liquid storage container to said supply air pipe,” as recited in claim 3. As discussed above, Hirakata and Mizuno do not teach or suggest this feature. Kaneko teaches a compressor to raise the reaction air pressure to be supplied to a fuel cell. Kaneko, however, does not teach or suggest that a signal pressure pipe communicates with the cooling liquid storage container and directs the hydrogen gas in the cooling liquid storage container to the supply air pipe, as recited in claim 3. Kaneko does not teach or suggest any pipe that connects the cooling liquid storage container to the supply air pipe.

For reasons set forth above, Applicants submit that Hirakata, Mizuno and Kaneko fail to teach or suggest all of the limitations of claim 3. Claim 7, which depends from claim 3, is not

rendered obvious over the cited references. Applicants therefore request withdrawal of the 35 U.S.C. §103(a) rejection of claim 7.

VII. Rejections of Claims 13-14 under 35 U.S.C. §103

Claims 13-14 are rejected under 35 U.S.C. §103(a) as being unpatentable over Hirakata in view of Mizuno and further in view of Jia. See the Office Action, page 12. Applicants respectfully traverse the rejection.

A. Claim 13

Applicants respectfully submit that Hirakata, Mizuno and Jia do not teach or suggest “a flow-in pipe connected to a downstream side of the air pump and the cooling liquid storage container, wherein a pressure in the signal pressure pipe is changed by changing a rotation speed of the air pump,” as recited in claim 13.

As discussed above, the combination of the Hirakata and Mizuno references does not teach or suggest this feature. The Jia reference teaches a controller that controls the oxidant shutoff valve, the fuel shutoff valve, and fuel conditioning valve to provide hydrogen directly to the cathode. (Jia, paragraph 21). The Jia reference, however, does not teach or suggest “a flow-in pipe connected to a downstream side of the air pump and the cooling liquid storage container, wherein a pressure in the signal pressure pipe is changed by changing a rotation speed of the air pump,” as recited in claim 13. The Jia reference does not teach or suggest any pipe that is connected to the cooling liquid storage container and the pressure of which is controlled by the air pump.

Applicants also respectfully submit that Hirakata, Mizuno and Jia do not teach or suggest that “said flow-in pipe and said flow-out pipe communicate with said cooling liquid storage container and said supply air pipe so that said flow-in pipe directs the air in said supply air pipe to said cooling liquid storage container and said flow-out pipe directs the mixed gas in said cooling liquid storage container to said supply air pipe,” as recited in claim 13.

As discussed above, the Hirakata reference teaches the collection of the hydrogen gas from the cooling water while the Mizuno reference teaches a hydrogen dilutor. The hydrogen

dilutor of the Mizuno reference mixes the hydrogen gas discharged from a fuel cell with the oxygen off-gas that is also discharged from the fuel cell, and introduces the mixed gas into the oxygen off-gas discharging channel. The combination of the Hirakata and Mizuno references does not teach or suggest that “said flow-in pipe and said flow-out pipe communicate with said cooling liquid storage container and said supply air pipe so that said flow-in pipe directs the air in said supply air pipe to said cooling liquid storage container and said flow-out pipe directs the mixed gas in said cooling liquid storage container to said supply air pipe,” as recited in claim 13. The Hirakata and Mizuno references do not teach or suggest two separate pipes, that is, the flow-in pipe and the flow-out pipe that connect the cooling liquid storage container to the supply air pipe.

The Jia reference teaches a controller that controls the oxidant shutoff valve, the fuel shutoff valve, and fuel conditioning valve to provide hydrogen directly to the cathode. (Jia, paragraph 21). The Jia reference, however, does not teach or suggest that “said flow-in pipe and said flow-out pipe communicate with said cooling liquid storage container and said supply air pipe so that said flow-in pipe directs the air in said supply air pipe to said cooling liquid storage container and said flow-out pipe directs the mixed gas in said cooling liquid storage container to said supply air pipe,” as recited in claim 13. The Jia reference does not teach or suggest two separate pipes, that is, the flow-in pipe and the flow-out pipe that connect the cooling liquid storage container to the supply air pipe.

Furthermore, in the Jia reference, *only a hydrogen gas* is supplied to the cathode of a fuel cell for quick conditioning purposes. In contrast, the flow-out pipe of the present application supplies a mixed gas to the cathode of the fuel cell. The Jia reference does not teach or suggest that a mixed gas is supplied to the cathode of a fuel cell.

For reasons set forth above, Applicants submit that Hirakata, Mizuno and Jia fail to teach or suggest all of the limitations of claim 13. Applicants therefore request withdrawal of the rejection of claim 13.

B. Claim 14

Claim 14 depends from claim 15 and, as such, incorporates the patentable features of claim 13. Applicants therefore request withdrawal of the rejection of claim 14.

VIII. Conclusion

In view of the above amendment, Applicants believe the pending application is in condition for allowance.

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